

**WHAT IS CLAIMED IS:**

1. A non-blocking crossbar, comprising:

n inputs, n numbering at least two;

n outputs, each of said outputs having a destination first-in,  
first-out buffer (FIFO) and n crossbar FIFOs interposing  
corresponding ones of said n inputs and said destination FIFO; and  
a scheduler configured to cause a packet to be transmitted  
from one of said inputs toward one of said outputs only when both  
said destination FIFO associated therewith and an interposing one  
of said crossbar FIFOs are available to contain said packet.

2. The non-blocking crossbar as recited in Claim 1 wherein  
said scheduler is further configured to select one of said inputs  
based upon a priority thereof.

3. The non-blocking crossbar as recited in Claim 1 wherein  
said scheduler is further configured to select one of said outputs  
based upon a priority thereof.

4. The non-blocking crossbar as recited in Claim 1 wherein  
at least two of said n inputs are coupled to different types of  
packet based fabrics.

5. The non-blocking crossbar as recited in Claim 1 wherein  
2 said first input and said first output is coupled to a SONET  
3 network, said second input and said second output is coupled to a  
4 Gigabit Ethernet network, and said third input and said third  
5 output is coupled to another Gigabit Ethernet network.

6. The non-blocking crossbar as recited in Claim 1 wherein  
2 each of said outputs further comprises an output arbiter configured  
3 to select one of said crossbar FIFOs and transfer a packet therein  
4 to said destination FIFO.

7. The non-blocking crossbar as recited in Claim 6 wherein  
2 said output arbiter is further configured to select said one of  
3 said crossbar FIFOs based upon packet priority.

8. A method of operating a non-blocking crossbar,  
comprising:

employing n inputs, n numbering at least two;

employing n outputs, each of said outputs having a destination  
first-in, first-out buffer (FIFO) and n crossbar FIFOs interposing  
corresponding ones of said n inputs and said destination FIFO; and

scheduling a packet to be transmitted from one of said inputs  
toward one of said outputs only when both said destination FIFO  
associated therewith and an interposing one of said crossbar FIFOs  
are available to contain said packet.

9. The method as recited in Claim 8 wherein said scheduling  
further comprises selecting one of said inputs based upon a  
priority thereof.

10. The method as recited in Claim 8 wherein said scheduling  
further comprises selecting one of said outputs based upon a  
priority thereof.

11. The method as recited in Claim 8 wherein at least two of  
said n inputs are coupled to different types of packet based  
fabrics.

12. The method as recited in Claim 8 wherein said first input  
2 and said first output is coupled to a SONET network, said second  
3 input and said second output is coupled to a Gigabit Ethernet  
4 network, and said third input and said third output is coupled to  
5 another Gigabit Ethernet network.

13. The method as recited in Claim 8 further comprising  
2 selecting one of said crossbar FIFOs and transferring a packet  
3 therein to said destination FIFO.

14. The method as recited in Claim 13 wherein said selecting  
2 further comprises selecting said one of said crossbar FIFOs based  
3 upon packet priority.

15. A multi-channel network line card for packet based

2 networks, comprising:

3 n physical interfaces, n numbering at least three;

4 n network processors that converts a packet between protocols,  
5 each of said network processors coupled to corresponding ones of  
6 said n physical interfaces; and

7 a non-blocking crossbar coupled to said network processors and  
8 said physical interfaces, including:

9 n inputs that receive said packet from corresponding ones  
10 of said n network processors,

11 n outputs that transmit said packet to corresponding ones  
12 of said n physical interfaces, each of said outputs having a  
13 destination first-in, first-out buffer (FIFO) and n crossbar  
14 FIFOs interposing corresponding ones of said n inputs and said  
15 destination FIFO, and

16 a scheduler that causes said packet to be transmitted  
17 from one of said inputs toward one of said outputs only when  
18 both said destination FIFO associated therewith and an  
19 interposing one of said crossbar FIFOs are available to  
20 contain said packet.

16. The multi-channel network line card as recited in Claim  
2 15 wherein said network processors further include:

3 a fast pattern processor that receives said packet from  
4 corresponding ones of said n physical interfaces, said fast pattern  
5 processor analyzes and classifies said packet; and

6 a routing switch processor that process said packet classified  
7 by said fast pattern processor, performs traffic management and  
8 converts said packet into an appropriate network protocol.

17. The multi-channel network line card as recited in Claim  
2 15 wherein said scheduler selects one of said inputs based upon a  
3 priority thereof and selects one of said outputs based upon a  
4 priority thereof.

18. The multi-channel network line card as recited in Claim  
2 15 wherein at least two of said n inputs are coupled to different  
3 types of packet based networks.

19. The multi-channel network line card as recited in Claim  
2 15 wherein said first physical interface is coupled to a SONET  
3 network, said second physical interface is coupled to a Gigabit  
4 Ethernet network, and said third physical interface is coupled to  
5 another Gigabit Ethernet network.

20. The multi-channel network line card as recited in Claim  
2 15 wherein each of said outputs further comprises an output arbiter  
3 configured to select one of said crossbar FIFOs based upon packet  
4 priority and transfer a packet therein to said destination FIFO.

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